



**THE
ONTARIO WATER RESOURCES
COMMISSION**

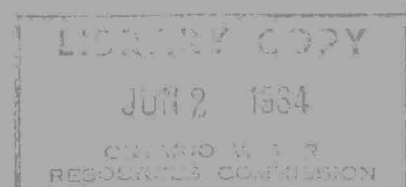
**REPORT ON
WATER POLLUTION SURVEY
OF THE
CROWE RIVER
WITH PERTINENT
SANITARY SURVEY REPORTS
ON THE
VILLAGE OF HAVELOCK
VILLAGE OF MARMORA**

July 18th to 21st

1961

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Report on
WATER POLLUTION SURVEY
of the
CROWE RIVER
with pertinent
SANITARY SURVEY REPORTS
on the
VILLAGE OF HAVELOCK
VILLAGE OF MARMORA

by
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District Engineer

July 18th to 21st

1961



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REPORT ON
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WATER POLLUTION SURVEY

of the

CROWE RIVER

INTRODUCTION

In conjunction with a request from officials of the Crowe Valley Conservation Authority, a water pollution survey of the Crowe River and its tributaries was conducted by Commission staff during the period of July 18th to 21st, 1961. An overall sampling program was completed, with samples being collected from municipal outfalls, as well as from the waters of the Crowe River system at appropriate locations.

GENERAL

Preliminary enquiries had been made on February 17th, 1961, to obtain information with respect to the disposal of storm water, sanitary and industrial wastes, at Havelock and Marmora. The co-operation which was received from the following officials during the initial and subsequent interviews, is appreciated:

Crowe Valley Conservation Authority

Mr.W. Van Steenburgh, Chairman, R.R.1, Havelock;

Mr.L.Hamel Cooke, Secretary-Treasurer, Havelock.

Village of Havelock

Mrs.D.A. McMillen, Village Clerk, Havelock;

Mr.B.M.Bell, Village Sanitary Inspector, Havelock.

Village of Marmora

Miss M. Savage, Village Clerk, Marmora;

Dr. H. G. Parkin, Medical Officer of Health for Village of Marmora, and the Townships of Marmora, Lake and Rawdon, all located at least in part, within the Crowe River Watershed.

An acknowledgement is made to the Ontario Department of Commerce and Development for information obtained from the Crowe Valley Conservation Report.

CROWE RIVER WATERSHED

Geography of Area

The Crowe River drains an area of approximately 780 square miles, and empties into the Trent River just downstream from Healey Falls. The drainage area is elongated in shape, its greatest length from north to south measuring approximately 60 miles, and its greatest width from east to west measuring approximately 36 miles.

Throughout the watershed, a vast system of lakes and smaller rivers drains to the Crowe. Lakes of major size are Paudash, Chandos, Wollaston, Limerick, Kasshabog, Round, Belmont, and Crowe. The well-defined section of the Crowe River is from Paudash Lake to the Trent River. In the lower reaches of the river the principal tributary is Beaver Creek which converges with the river north of the Village of Marmora. Plato Creek flows in a north-easterly direction from Havelock to empty into Crowe Lake.

The numerous rapids in the watercourse provided attractive locations for water-powered saw-mills during the

early days of settlement in the watershed. The use of local saw-mills developed somewhat slowly since the initial practice was to float timber, harvested from the forests in the Crowe Watershed, downstream to mills on the Trent.

The dark colour of the waters in some sections of the Crowe River system is attributed to the mineralogy of the Canadian Shield bedrock and to the numerous marshy areas which are drained to the watercourse.

PHYSIOGRAPHY

The topography of the Crowe Valley can be separated into two broad sections with Highway No.7 being the approximate dividing line. This dividing line actually extends from the east end of Stoney Lake into the Crowe watershed, then south-easterly to the south of Round Lake, east to Belmont Lake, south to Highway No.7, east to the county line, north-east around Crowe Lake, and north-easterly out of the watershed.

North of the division line lies the Precambrian bedrock of the Canadian Shield. In this region a large plateau gradually rises 1,000 feet in 35 miles, in a south west to north-east direction. Low hills and ridges are prevalent in this area. Numerous lakes, streams and swamps are located in the depressions. This section of the watershed is not generally suited to agriculture, although some local pockets of soil exist.

South of the Canadian Shield, there are a variety of land forms varying from rough areas where shallow soil and boulders render the area best suited for forest cover, to

sections where deep soil will support a thriving pursuit of agriculture.

MUNICIPALITIES

The following municipalities lie either wholly or partly within the Crowe River watershed:

In the County of Haliburton:

Township of Cardiff

In the County of Hastings:

Village of Marmora
Township of Cashel
Township of Faraday
Township of Herschel
Township of Lake
Township of Limerick
Township of Marmora
Township of Rawdon
Township of Tudor
Township of Wollaston

In Northumberland County:

Township of Seymour

In Peterborough County:

Village of Havelock
Township of Asphodel
Township of Belmont
Township of Burleigh
Township of Chandos
Township of Dummer
Township of Methuen

The incorporated centres of population within this watershed are the Villages of Havelock and Marmora which are located within the counties of Peterborough and Hastings, respectively. There are numerous small rural communities.

In conjunction with this water pollution survey of the Crowe River system, municipal sanitary surveys were conducted at the Villages of Havelock and Marmora.

The Village of Havelock covers an area of approximately 431 acres with a population of 1,271 according to the 1961 Municipal Directory. An improved tributary of Plato Creek flows through the village, receiving surface run-off flows as well as some direct or indirect waste discharges from private premises. Private sewage disposal facilities are employed. The municipal water works serves most of the municipality with water obtained from a well.

The Village of Marmora covers an area of approximately 370 acres with a population of 1,358. Storm waters discharge either directly to the Crowe River, or through municipal storm sewers thereto. Although private sewage disposal facilities generally are employed, some premises discharge wastes directly to the watercourse. A municipal water works system presently is being constructed, and will permit residents to discontinue the use of private well water which is, in some instances, of unreliable bacterial quality.

WATER USES

Municipal use of the Crowe River is limited in extent. Marmora will draw its municipal water supply from the watercourse. A tributary of the Crowe River system receives the effluent from the municipal sewage lagoon at Cardiff in the northern part of the watershed.

The Crowe River and its Plato Creek tributary may be the receiving waters for the effluents from eventual municipal sewage works at Marmora and Havelock, respectively.

Industrial use of the Crowe River system is of some importance.

Reportedly, a creamery in Havelock discharges wash waters through the municipal drainage course to Plato Creek.

The Marmora Cheese and Butter Company Limited plant discharges untreated industrial wastes to a small tributary of Beaver Creek which empties into the Crowe River just north of Marmora.

The methods of industrial waste disposal used at the Bicroft Uranium Mines Limited and the Faraday Uranium Mines Limited are described in this report.

Recreational use of the numerous lakes and rivers in the Crowe River system is important. The watershed is used extensively for recreational purposes during the summer months. The existence of more than 500 summer residences on the shoreline of Chandos Lake indicates the extensive development which has occurred on these lakes.

Fishing, boating and swimming have become popular, especially near tourist resorts. A recently constructed motel and dining lounge at Twin Lakes is attracting vacationers to the area.

HYDROLOGY

Precipitation records are available from the Climatology Section, Meteorological Division, Department of Transport. Measurements which have been recorded at a station in this vicinity indicate an average annual precipitation of approximately 32 inches.

Stream flow data for the Crowe River is available for recent years only. A hydrometric gauging station is located on the river at Marmora. According to information obtained from the Water Resources Branch, Department of Northern Affairs and National Resources, the following flows occurred in the Crowe River during this sampling program:

July 18th- 525 c.f.s.(cubic feet per second)

July 19th- 498 c.f.s.

July 20th- 454 c.f.s.

Although maximum and minimum volumes of stream flow normally would occur during spring freshets, and in the summer and autumn months, respectively, these flows would be influenced to some degree by dams and control works.

The Crowe Valley Conservation Authority was established in 1953 and has undertaken measures to effect water conservation and flood control. Dams have been constructed and repaired to assist in controlling surface run-off waters and thereby promoting the stability of flow in the watercourse.

The conservation authority was instrumental in constructing a dam on the Crowe River at Marmora in order to control flows from Crowe Lake.

A dam on the Crowe River just downstream from its exit from Paudash Lake may regulate the flow of water from the lake.

Conservation agencies in general have recognized the necessity for impounding excessive surface run-off flows for subsequent release to augment depleted stream flows.

The Ontario Department of Lands and Forests operates a fish hatchery on the Crowe River where it drains Cordova Lake, approximately 2 miles north-west of the community of Cordova Mines. A dam is located on the river near the fish hatchery and is used to control water levels in Cordova Lake.

SAMPLING PROCEDURE

The locations of sampling points are shown on the appended map of the Crowe River watershed and the maps of the Villages of Havelock and Marmora. "Grab" samples were collected; forty(40) ounce samples being used for sanitary chemical analysis, and six (6) ounce samples for bacteriological examination. Tests were conducted at the Ontario Water Resources Commission laboratory, Toronto. The laboratory results are appended to this report.

The most common analyses of sanitary significance are: Biochemical Oxygen Demand, Suspended Solids, and the total coliform determination which was obtained by the membrane filter technique and is reported as a Membrane Filter Coliform Count.

Biochemical Oxygen Demand(B.O.D.)

The B.O.D. of sewage, industrial wastes or polluted waters, is the oxygen required during stabilization(natural purification in a stream) of the decomposable organic matter or chemical material, by aerobic biochemical action. Unless otherwise noted, a 5-day B.O.D. determination is reported. A high B.O.D. is indicative of organic or chemical pollution. A desirable upper limit in natural surface water normally is four(4) parts per million.

Suspended Solids

These results are reported in parts per million and indicate the measure of undissolved solids of organic or inorganic nature. Where suspended solids values approach 20 parts per million or less, laboratory difficulties may result in these values being determined as turbidity and are reported in silica units.

Membrane Filter Coliform Count

The membrane filter technique is employed to obtain a direct enumeration of coliform organisms and is reported per 100 millilitres. Waters having a membrane filter coliform count in excess of the desirable upper limit of 2,400 organisms are considered undesirable for municipal water supplies and bathing purposes.

Dissolved Oxygen tests were performed at several locations to determine the content of dissolved oxygen in the waters of the Crowe River system.

Weather Conditions

Slight precipitation occurred in the Havelock area on the afternoon of July 18th. At other times, however, the weather was clear and warm with atmospheric temperatures being in excess of 80°F.

INVESTIGATIONS PERTAINING TO THE DISPOSAL OF URANIUM MINING WASTES

Two (2) uranium mining operations are located in the northern part of the Crowe River watershed, and discharge partially treated wastes as follows:

Bicroft Uranium Mines Limited- to Auger Lake and
thence to Inlet Bay and Paudash Lake;

Faraday Uranium Mines Limited- to Bow Lake

Both lakes are drained by the Crowe River or tributaries
thereof.

The Industrial Wastes Branch, Division of Laboratories
and Research, of this Commission, has made regular inspections
of industrial waste disposal procedures at these mines since
the inception of operations there.

Bicroft Uranium Mines Limited

The waters of Auger Lake receive the tailing wastes
from milling operations at the Bicroft mines which are located
in Haliburton County.

The mining company has co-operated with this Commission
in efforts to control the quality of its industrial wastes. Flows
from Auger Lake enter Inlet Bay and thence to Paudash Lake and
the Crowe River. Routine investigations are made there by the
Industrial Wastes Branch of this Commission.

Faraday Uranium Mines Limited

The property of the Faraday Uranium Mines Limited is
located at the north end of Bow Lake in Faraday Township, County
of Hastings.

Production at the Faraday mines is based on mining
uranium-bearing ore and concentrating the metal as uranium

oxide for sale and refining elsewhere. The ore is crushed and ground to a flour-like particle-size, and then is subjected to leaching and oxidizing by a strong sulphuric acid and sodium chlorate solution. Most of the metals present in the ore are dissolved in the acid solution, which then is separated from the undissolved particles either by sedimentation and decantation or by filtration. The pH of the uranium-bearing liquor is raised by the controlled addition of slaked lime, and the solution is passed through ion exchange resins which are selective for uranium compounds. The resins then are eluted with acid to release the uranium oxide which subsequently is precipitated by the addition of sodium hydroxide. The concentrate, U_3O_8 , then is prepared for shipment.

Two main sources of waste may be considered:

(1) the tailings, or finely divided waste rock that remains after the separation from the uranium-bearing acid solution, and (2) the barren solution that remains following the removal of the uranium oxide concentrate by ion-exchange treatment. Water is used to carry the tailings to the disposal area as a slurry. Slaked lime is added at the mill to maintain the pH of the slurry at or near 6.5. The barren solution is treated with lime under automatically controlled conditions to pH 6.5, and is mixed with the tailings slurry for discharge to the tailings disposal area. A third, and somewhat lesser waste, is the mine water that is pumped from underground and also is discharged to the tailings area.

A tailings pond receives the waste and permits settling of suspended material. The effluent may seep through a gravel dyke to the waterway. An auxiliary pond is provided.

Reportedly, untreated or partially treated sanitary wastes gain access to the main and auxiliary tailings disposal areas. The bacteriological results of samples taken from Bow Lake by members of the Industrial Wastes Branch of this Commission have revealed a coliform content well within desirable limits for such waters.

Residents of the Bow Lake area, as well as officials of the Crowe Valley Conservation Authority, have expressed concern with respect to the possibility that radioactivity in the waters of the lake may have reached dangerous levels. An intensive study of these conditions is being made by: Industrial Wastes Branch of this Commission; Industrial Hygiene Branch, Ontario Department of Health; Ontario Department of Mines. Laboratory analyses are conducted at the laboratory of the Industrial Hygiene Branch, Department of Health.

In assessing the effects of these mining wastes on the lake waters, or in any instance where radioactive wastes are discharged to natural waters, the factors of prime concern are: the type of radioactive waste, and the concentration thereof.

Officials of the conservation authority have expressed concern with respect to the greenish colour which has appeared in the waters of Bow Lake. This colour change from the characteristic brownish tinge to light green appears to have caused local residents to associate this phenomenon with the

presence of harmful contaminants in the water. This condition may have resulted from high concentrations of calcium salts in the lake water, which reportedly may not adversely affect the biota of the lake.

The consensus of official opinion appears to be that, although levels of radioactivity in Bow Lake may not have reached excessive proportions, it will be necessary to continue these investigations for some time before a final opinion can be formed.

SEWAGE LAGOON AT COMMUNITY OF CARDIFF

The community of Cardiff is located in the Improvement District of Bicroft, County of Haliburton. The population is estimated at 800 to 900.

Sewage flows are discharged to a municipal waste treatment lagoon of approximately 4 to 5 acres in area and constructed in 2 sections. Effluent from this sewage lagoon discharges to Mink Creek, a tributary of the Inlet Bay arm of Paudash Lake.

Samples were taken on July 19th from the lagoon effluent, and from Mink Creek at the side road just downstream from the lagoon outfall. The following laboratory results indicate the satisfactory sanitary chemical quality and coliform content of the lagoon effluent at the time of sampling:

DATE OF SAMPLE <u>1961</u>	LAB. <u>NO.</u>	5-DAY B.O.D. <u>(IN PPM.)</u>	SOLIDS (IN PPM.)			MF COLIFORM COUNT/100ML.
			TOTAL	SUSP.	DISS.	
JULY 19TH 9:00 PM.	R-2482	9.2	178	12	166	20

The low volume of flow from the lagoon was noted, and may be attributed, in part, to the fact that many Cardiff residents who are employed by the Bicroft Uranium Mines Limited were on vacation.

MARMORA CHEESE AND BUTTER COMPANY LIMITED

This plant is located approximately 4 miles north of Marmora. Industrial wastes are discharged from this cheese factory to a small watercourse which empties into Beaver Creek, a tributary of the Crowe River. There was no discharge from the plant at the time of this inspection.

Reportedly, operations at this plant may not be continued beyond the present year. An inspection report has been prepared for distribution to the appropriate officials.

SAMPLING RESULTS

The results of stream and outfall samples are shown in Table I and Table II, respectively, which are appended to this report.

The results of laboratory tests performed on samples collected from the waters of the Crowe River system during this survey revealed generally satisfactory conditions with respect to sanitary chemical and bacteriological quality. The Dissolved Oxygen tests, which were performed at four sampling locations, revealed normal seasonal conditions in the watercourse.

Wastes having a high coliform content are discharged from the municipal drainage course at Havelock to Plato Creek which empties into Crowe Lake.

The sanitary chemical quality and coliform content of the Cardiff sewage lagoon effluent was within acceptable limits at the time of sampling.

SUMMARY

The laboratory results of tests performed on samples collected from the Crowe River system during the period of July 18th to 20th, 1961, revealed generally satisfactory conditions with respect to sanitary chemical and bacteriological quality.

Investigations to ascertain the levels of radio-activity in the waters of Bow Lake are being conducted by the Industrial Wastes Branch, Division of Laboratories and Research, of this Commission. Assistance is being received from the Industrial Hygiene Branch, Ontario Department of Health, and from the Ontario Department of Mines. It will be necessary to continue these studies for some time before final results will be available.

The discharging of wastes from Havelock to the Plato Creek tributary of the Crowe River system is described in the appended report on the "Municipal Sanitary Survey of the Village of Havelock". Although a high coliform content is revealed in these municipal drainage flows, this adverse bacterial content is not reflected in the waters of Plato Creek downstream from Havelock.

The laboratory results indicate that the Cardiff sewage lagoon is functioning adequately.

Industrial wastes are discharged from the Marmora Cheese and Butter Company Limited plant to a tributary of the Crowe River system.

RECOMMENDATIONS

Appropriate action should be taken at Havelock to ensure that all untreated or inadequately treated wastes will be excluded from the municipal drainage course which discharges to Plato Creek.

Adequate methods of industrial waste disposal should be employed at the Marmora Cheese and Butter Company Limited plant, in order to ensure that these wastes will be excluded from the local watercourse.

MUNICIPAL SANITARY SURVEY OF THE VILLAGE OF HAVELOCK

GENERAL

In conjunction with this water pollution survey of the Crowe River system, an associated municipal sanitary survey was conducted at the Village of Havelock with respect to water supply, sewage disposal, storm water disposal, and any condition which could affect the quality of the waters in the river and its tributaries. Investigations and enquiries were made to determine the sources and significance of outfalls discharging to the Plato Creek tributary of the Crowe River within this municipality.

Havelock is located near the junction of Highway No.7 and Highway No.30, approximately 12 miles west of Marmora. The village is a division point on the Canadian Pacific Railway line from Toronto to Ottawa. The municipality has a population of approximately 1,271 and a total area of 431 acres.

Plato Creek flows in an easterly direction through the southern part of the village, receiving drainage flows therefrom, and then pursues a north-easterly course to its mouth at Crowe Lake.

HEALTH SERVICES

The installation of new private sewage disposal systems in Havelock is supervised by Mr.B.M.Bell, Sanitary Inspector. The medical officer of health is Dr.D.J.Holdcroft.

WATER SUPPLY

The construction of Havelock's municipal water works was completed early in 1958 with assistance from the Ontario Water Resources Commission. Water is obtained from a 50-foot drilled well located in the fair grounds, and is pumped to the distribution system without prior treatment. The rated capacity of the well apparently has decreased from 75 G.P.M. to 50 G.P.M. The Layne vertical turbine pump of 100 G.P.M. rated capacity is driven by a 7-1/2 H.P. electric motor. Partial closing of the gate valve has been practised since the decrease in well capacity occurred. The steel standpipe is located in the north-western part of the village and provides a water storage capacity of 150,000 gallons. There are approximately 290 existing water services out of a potential 400. Water is sold to domestic and commercial premises at a flat monthly rate. An inspection and report of this water works was made early in 1961 by Mr.H.Browne, P.Eng., of this Commission.

An increased demand for water from the municipal supply, combined with the apparent decrease in the capacity of the one existing well, has prompted local officials to consider the development of an additional well to augment the present supply. The request of the Canadian Pacific Railway Company for 30,000 gallons of water per month from the municipal supply, as well as the reported need for additional water for fire protection in the village, indicates the desirability for increasing the municipal supply. The C.P.R. has, in the past, drawn its water supply from Plato Creek.

Reportedly, some premises in Havelock continue to draw water from shallow dug wells. Many of the private water supplies, which were employed prior to the provision of a municipal supply, were of an unsatisfactory bacterial quality.

A survey for developing additional ground water supplies has been undertaken by the Ground Water Branch, Water Resources Division of this Commission.

SEWAGE DISPOSAL

Since municipal sewage works have not been developed at Havelock, methods of private sewage disposal are employed.

Although the appended laboratory results reveal the presence of sanitary waste in the improved watercourse which extends through the village and ultimately discharges to Plato Creek, Mr. Bell has reported that these wastes

probably seep into the drainage course from inadequate or malfunctioning private sewage disposal units.

Local officials have received a request for approval for the installation of a commercial laundromat service. Approval has been held in abeyance. The opinion of provincial officials is that commercial laundry services should not be permitted unless municipal sanitary sewers and treatment works are available. Due to the volume and complex characteristics of laundry waste, it is somewhat difficult to deal effectively with such waste by employing a sub-surface disposal system.

STORM DRAINAGE

The small watercourse having its source in a marshy area at the western extremity of the municipality flows in an easterly direction through the village as shown on the appended map of Havelock. During most of its course this waterway has been tiled and therefore assumes the nature of a municipal storm sewer. Another small drainage course converges with the aforementioned improved watercourse in the east part of the village, the combined flows then discharging under Highway No.7 and continuing to Plato Creek.

Samples were collected on July 18th from these combined flows where they discharge under Highway No.7. The following results of laboratory tests indicate the presence of sanitary waste in these flows:

<u>SAMPLE POINT NO.</u>	<u>LAB. NO.</u>	<u>5 DAY B.O.D. (IN PPM.)</u>	<u>TOTAL SOLIDS (IN PPM.)</u>	<u>TURBIDITY IN SILICA UNITS</u>	<u>MF COLIFORM COUNT PER 100 ML.</u>
TXP 6L.9D	R-2339	1.5	464	1	269,000

Reportedly, wash waters may be discharged from the Havelock Creamery to this municipal drainage course in that portion thereof that has been tiled.

INDUSTRY

During past years the principal activity in Havelock has been the divisional point in the C.P.R., with its associated roundhouse and other service buildings. These activities have diminished somewhat due to the advent of diesel powered locomotives. Reportedly, the railway premises are served by satisfactory sub-surface sewage disposal systems.

The industries of note are:

Canada Fishing Tackle and Sports Limited
Havelock Creamery
Smith's Dairy

The first industry mentioned would have waste flows only from sanitary fixtures.

The Havelock Creamery may discharge wash waters to the local municipal drainage ditch which terminates at Plato Creek.

Smith's Dairy discharges wash waters to an underground stone leaching pit, according to information received.

SIGNIFICANCE OF WASTE DISCHARGED FROM HAVELOCK TO PLATO CREEK

As described previously in this report, drainage flows from Havelock gain access to the Plato Creek tributary of the Crowe River system. The following laboratory results indicate the effects of these wastes on the waters of Plato Creek on July 18th, 1961:

<u>SAMPLE POINT NO.</u>	<u>LOCATION OF SAMPLE</u>	<u>5-DAY B.O.D. (IN PPM.)</u>	<u>TOTAL SOLIDS (IN PPM.)</u>	<u>TURBIDITY IN SILICA UNITS</u>	<u>MF COLIFORM COUNT/100ML.</u>
TXP 62.8	PLATO CREEK AT HWY.#7 UPSTREAM FROM HAVELOCK	0.7	322	1	290

<u>SAMPLE POINT NO.</u>	<u>LOCATION OF SAMPLE</u>	<u>5-DAY B.O.D. (IN PPM.)</u>	<u>TOTAL SOLIDS (IN PPM.)</u>	<u>TURBIDITY IN SILICA UNITS</u>	<u>MF COLIFORM COUNT/100ML</u>
TXP 61.9D	DRAINAGE DISCHARGE FROM HAVELOCK TO PLATO CREEK	1.5	464	1	269,000
TXP 61.3	PLATO CREEK AT EAST LIMIT OF HAVELOCK	0.9	316	1	460

Although the sanitary chemical and bacteriological quality of the waters of Plato Creek may not have been adversely affected to a significant extent by the waste flows from Havelock, the coliform content of these municipal discharges is excessive, according to the laboratory results of the sample taken on July 18th. The laboratory results indicate that inadequately treated sanitary waste is present in these flows.

SUMMARY

An improved watercourse pursues an easterly course through Havelock and conducts contaminants from this municipality to Plato Creek, a tributary of the Crowe River system. The excessive coliform content in this municipal drainage course indicates that untreated or inadequately treated sanitary wastes are discharged either directly or indirectly thereto.

RECOMMENDATIONS

Officials of the Village of Havelock should ensure that all untreated or inadequately treated wastes are excluded from the flows which discharge from this municipality to Plato Creek.

MUNICIPAL SANITARY SURVEY OF THE VILLAGE OF MARMORA

GENERAL

A municipal sanitary survey of the Village of Marmora, was conducted on July 19th, 1961, to investigate conditions within the municipality which are pertinent to the sanitary chemical and bacteriological qualities of the Crowe River. Enquiries were made with respect to water supply, sewage disposal and storm water disposal. Appended is a map of the village showing outfalls and sampling points in the area.

Marmora straddles the Crowe River at Highway No.7. The greater part of the village is concentrated east of the river. The population of the municipality approximates 1,358 and the total area is 370 acres.

GEOGRAPHY AND GEOLOGY

The sloping terrain allows drainage flows from Marmora to reach the waters of the Crowe River.

Reportedly, in the section of Marmora lying south of Highway No.7, 20 to 30 feet of overburden covers the bedrock. To the north of the highway, where the commercial section of the village is located, a minimal depth of overburden prevails.

HEALTH SERVICES

The local medical officer of health is Dr.H.G.Parkin, who personally inspects the installation of new septic tank systems, as well as investigating related sewage disposal problems. Dr.Parkin has expressed grave concern for the bacterial quality of the river water at the bathing area south of Highway No.7. The coliform content of these waters was satisfactory for bathing purposes at the time of sampling on July 20th, 1961.

WATER SUPPLY

The construction of municipal water works at Marmora is approaching completion. With assistance from the Ontario Water Resources Commission, the village has embarked on a program to draw and treat water from the Crowe River for distribution to the municipality.

The new water purification plant has been constructed near the former mill race on the Crowe River. River water will flow by gravity through a 270-foot intake pipe of 10-inch diameter from the upstream side of the dam into the intake well at the water purification plant. A portion of the incoming flow will be retained for treatment. The remainder will be allowed to flow to the river. Low lift pumps will deliver water to the mixing chamber. The operation of the vacuum-type diatomite filter consists of introducing a mix of diatomaceous earth and activated carbon into the treatment tank to pre-coat a series of plates with the slurry which adheres to a plastic covering and is held on the plates by suction. Filterable material in the raw water is retained on this surface. The design capacity of the water purification plant is 150 U.S. GPM. Facilities for chlorination are being provided. The water will be pumped to the distribution system and the standpipe.

Although new water distribution piping has been installed, a proposal to use an existing water main extending from the site of the water purification plant to the new distribution system has resulted in some delay in completion of the system. An internal pressure test indicated that the section of old piping would require replacement.

SEWAGE DISPOSAL

The majority of the premises in Marmora are served by septic tank systems, although many privies exist. On some premises an inadequate depth of overburden, combined with a limited available area, has resulted in the malfunctioning of some private sewage disposal systems in the commercial section of Marmora. Untreated or inadequately treated sanitary wastes reportedly discharge to the Crowe River or the flood plain thereof. A careful inspection on July 20th did not reveal any instance of sewage discharging to the river. Reportedly, such conditions arise on week-ends when increased use of sanitary fixtures at a hotel and theatre occur. According to information received, drainage from a funeral home and an automatic commercial laundromat may discharge to the low-lying area bordering the river. All of these potential sewage discharges would reach the river or its wooded border downstream from the municipal water works intake, and upstream from the bathing beach at Highway No.7.

PROPOSED SEWAGE WORKS

The Village of Marmora has adopted plans to construct a partial system of sanitary sewers and waste treatment unit with assistance from this Commission.

According to information received on July 20th from local officials, positive action on this project presently is somewhat indefinite due to the municipality's unforeseen financial commitment in replacing a section of old watermain.

The proposed limited sanitary sewer system was designed primarily to relieve sewage disposal problems in the congested commercial section of the village. According to plans approved by this Commission, sanitary sewers would be installed on McGill Street from Madoc Street to 205 feet north thereof, on Forsyth Street from Madoc Street southerly to Linn Street, and on Linn Street from Forsyth Street westward to the disposal site.

A 4-acre sewage lagoon presently is proposed, to be located between Cameron Street and the Crowe River, at the foot of Linn Street projected. Effluent from the lagoon would discharge to the Crowe River.

STORM DRAINAGE

Storm waters from Marmora flow to the Crowe River. Only one municipal storm sewer outlet was observed during this survey, and is located on the north side of Highway No. 7 where storm waters discharge to the flood plain on the east side of the river. The laboratory results of samples taken from this outfall (sampling point #TX 47.1W) on July 20th are reported as follows:

<u>LAB. NO.</u>	<u>5-DAY B.O.D. (IN PPM.)</u>	<u>TOTAL SOLIDS (PPM.)</u>	<u>TURBIDITY IN SILICA UNITS</u>	<u>MF COLIFORM COUNT /100 ML.</u>
R-2487	3.2	872	2	6

The above laboratory results reveal satisfactory conditions at this time.

INDUSTRIAL OUTFALLS

Enquiries and investigations were made in order to determine the methods of waste disposal employed by industrial firms in Marmora. Industrial activity within the municipality is somewhat limited in extent.

Neal's Dairy and the Marmora Dairy are located within the village, and pasteurize whole milk for the retail trade. Reports on industrial waste disposal procedures at these dairies have not been prepared since the wastes were not gaining access to the river at the time of this survey.

Neal's Dairy is located near the north-east corner of McGill Street and Madoc Street in the heart of Marmora's commercial district. Reportedly, wash waters are discharged to a sub-surface disposal system located on the dairy premises.

Marmora Dairy is located on the west side of Forsyth Street in the southern part of the municipality. The industrial wastes from this dairy flow from the rear of the premises to a marshy area located near Cameron Street as shown on the appended map of Marmora. These wastes were being contained in the marsh. It is not improbable that, during periods of excessive surface run-off, these wastes might reach the river.

The proposed partial municipal sanitary sewer system would serve both of these dairies.

SUMMARY

Reportedly, sewage flows discharge frequently from private sewer outlets to the flood plain of the Crowe River at Marmora. These flows originate on premises located in the commercial section of the village where conditions do not permit the installation of adequate sub-surface disposal systems. Such discharges were not evident at the time of this survey, but occur during week-ends, according to information received.

The laboratory results of samples collected from the Crowe River at the public bathing area in Marmora reveal satisfactory conditions in these waters with respect to bacteriological quality, at the time of sampling.

RECOMMENDATIONS

From the standpoint of environmental sanitation and protection of the sanitary chemical and bacteriological quality of the waters of the Crowe River at Marmora, it would be desirable for the village to proceed with its plans for constructing municipal sewage works. Even a partial sewage works development, as proposed, would alleviate the sewage disposal problems which exist in the commercial section of Marmora. Such a system could serve the Marmora Dairy where the industrial wastes presently discharge to a marshy area near the Crowe River.

R I V E R S U R V E Y

WATERSHED: CROWE RIVER

BY : R.BARRENS

DATE SAMPLED: SEE BELOW

ALL ANALYSES EXCEPT PH REPORTED IN PPM, UNLESS OTHERWISE INDICATED.

DATE OF SAMPLE	SAMPLE POINT NO.	LAB. NO.	5-DAY B.O.D.	SOLIDS			D.O.	SAMPLE TEMP. C.	TURBIDITY IN SILICA UNITS	BACTERIOLOGICAL LABORATORY	
				TOTAL	SUSP.	DISS.				LAB. No.	MF COLIFORM COUNT/100ML.
JULY 19	TX 38.4	R-2470	0.8	134	--	--	6.7	25°	1	R-7708	18
JULY 19	TX 41.0	R-2471	1.2	132	--	--	--	--	1	R-7709	1
JULY 20	TX 47.2	R-2484	0.7	132	--	--	6.5	27°	1	R-7722	15
JULY 20	TX 47.5	R-2485	0.8	130	--	--	6.5	27°	1	R-7723	11
JULY 20	TXB 48.6	R-2486	0.3	132	--	--	--	--	1	R-7724	36
JULY 18	TXP 54.5	R-2340	1.0	322	--	--	--	--	1	R-7515	220
JULY 18	TXP 61.3	R-2338	0.9	316	--	--	--	--	1	R-7513	460
JULY 18	TXP 62.8	R-2337	0.7	322	--	--	--	--	1	R-7512	290

R-2470 - CROWE RIVER AT CROWE BRIDGE- NEAR MOUTH OF RIVER.

R-2471 - CROWE RIVER AT ALLAN MILLS.

R-2484 - CROWE RIVER AT HIGHWAY NO.7 IN MARMORA.

R-2486 - BEAVER CREEK AT CORDOVA MINES ROAD.

R-2340 - PLATO CREEK AT FREEMAN CORNERS BRIDGE.

R-2338 - PLATO CREEK AT EAST LIMIT OF HAVELOCK.

R-2337 - PLATO CREEK AT HIGHWAY NO.7- WEST OF HAVELOCK.

R I V E R S U R V E Y

BY: R. BARRENS

WATERSHED: CROWE RIVER

DATE SAMPLED: SEE BELOW

ALL ANALYSES EXCEPT PH REPORTED IN PPM, UNLESS OTHERWISE INDICATED.

DATE OF SAMPLE	SAMPLE POINT No.	LAB. No.	5-DAY B.O.D.	SOLIDS			D.O.	SAMPLE TEMP. C.	TURBIDITY IN SILICA UNITS	BACTERIOLOGICAL LABORATORY	
				TOTAL	SUSP.	DISS.				LAB. No.	MF COLIFORM COUNT/100ML.
JULY 18	TXC 55.9	R-2342	1.2	338	--	--			1	R-7517	2,200
JULY 18	TX 56.3	R-2341	0.8	174	--	--			1	R-7516	6
JULY 19	TXN 63.5	R-2472	1.1	82	--	--			1	R-7710	10
JULY 18	TX 59.3	R-2343	0.7	214	--	--			1	R-7518	35
JULY 18	TX 63.9	R-2344	0.3	206	--	--			1	R-7519	38
JULY 19	TXD 82.3	R-2473	1.4	128	--	--			1	R-7711	246
JULY 19	TX 88.1	R-2475	0.7	154	--	--			1	R-7713	40
JULY 19	TXF 51.1	R-2474	0.9	136	--	--			2	R-7712	210

R-2343 - CORDOVA MINES CREEK AT ROAD ALLOWANCE JUST ABOVE JUNCTION WITH CROWE RIVER

R-2341 - CROWE RIVER AT BRIDGE JUST EAST OF CROWE BAY ON BELMONT LAKE

R-2472 - NORTH RIVER AT ROAD ABOVE ROUND LAKE

R-2343 - CROWE RIVER AT FIRST ROAD ABOVE BELMONT LAKE

R-2344 - CROWE RIVER AT CORDOVA MINES - VANSICKLE ROAD- ABOVE CORDOVA LAKE

R-2473 - DEER RIVER AT ROAD 1½ MILES ABOVE JUNCTION WITH CROWE RIVER

R-2475 - CROWE RIVER AT OWENBROOK- COEHILL ROAD, EAST OF CHANDOS LAKE

R-2474 - FARADAY CREEK AT OWENBROOK- COEHILL ROAD

R I V E R S U R V E Y

WATERSHED: CROWE RIVER

By: R. BARRENS

DATE SAMPLED: SEE BELOW

ALL ANALYSES EXCEPT PH REPORTED IN PPM.
UNLESS OTHERWISE INDICATED.

DATE OF SAMPLE	SAMPLE POINT No.	LAB. No.	5-DAY B.O.D.	SOLIDS			D.O.	SAMPLE TEMP. C.	TURBIDITY IN SILICA UNITS	BACTERIOLOGICAL LABORATORY	
				TOTAL	SUSP.	DISS.				LAB. No.	MF COLIFORM COUNT/100 ML.
JULY 19	TX 89.6	R-2476	0.9	160	--	--			1	R-7714	158
JULY 19	TXL 95.3	R-2477	0.9	118	--	--			1	R-7715	30
JULY 19	TX 95.4	R-2478	0.8	150	--	--	7.4	25°	2	R-7716	90
JULY 19	TX 106.9	R-2479	1.0	140	--	--			1	R-7717	16
JULY 19	TXM 113.9	R-2481	1.1	112	--	--			1	R-7719	270
JULY 19	TXB 108.9	R-2480	0.7	1174	--	--			1	R-7718	26

R-2476 - CROWE RIVER AT COEHILL- GLENALDA ROAD

R-2477 - CHANDOS LAKE BRANCH AT EXIT FROM CHANDOS LAKE- AT COEHILL RD.

R-2478 - CROWE RIVER AT ROSE ISLAND - COEHILL RD.

R-2479 - CROWE RIVER AT HIGHWAY No.28 AT EXIT FROM PAUDASH LAKE

R-2481 - MINK CREEK JUST BELOW CARDIFF SEWAGE LAGOON OUTFALL

R-2480 - EXIT FROM BOW LAKE AT HIGHWAY No.28

R I V E R S U R V E Y

WATERSHED: CROWE RIVER

BY: R. BARRENS

DATE SAMPLED: SEE BELOW

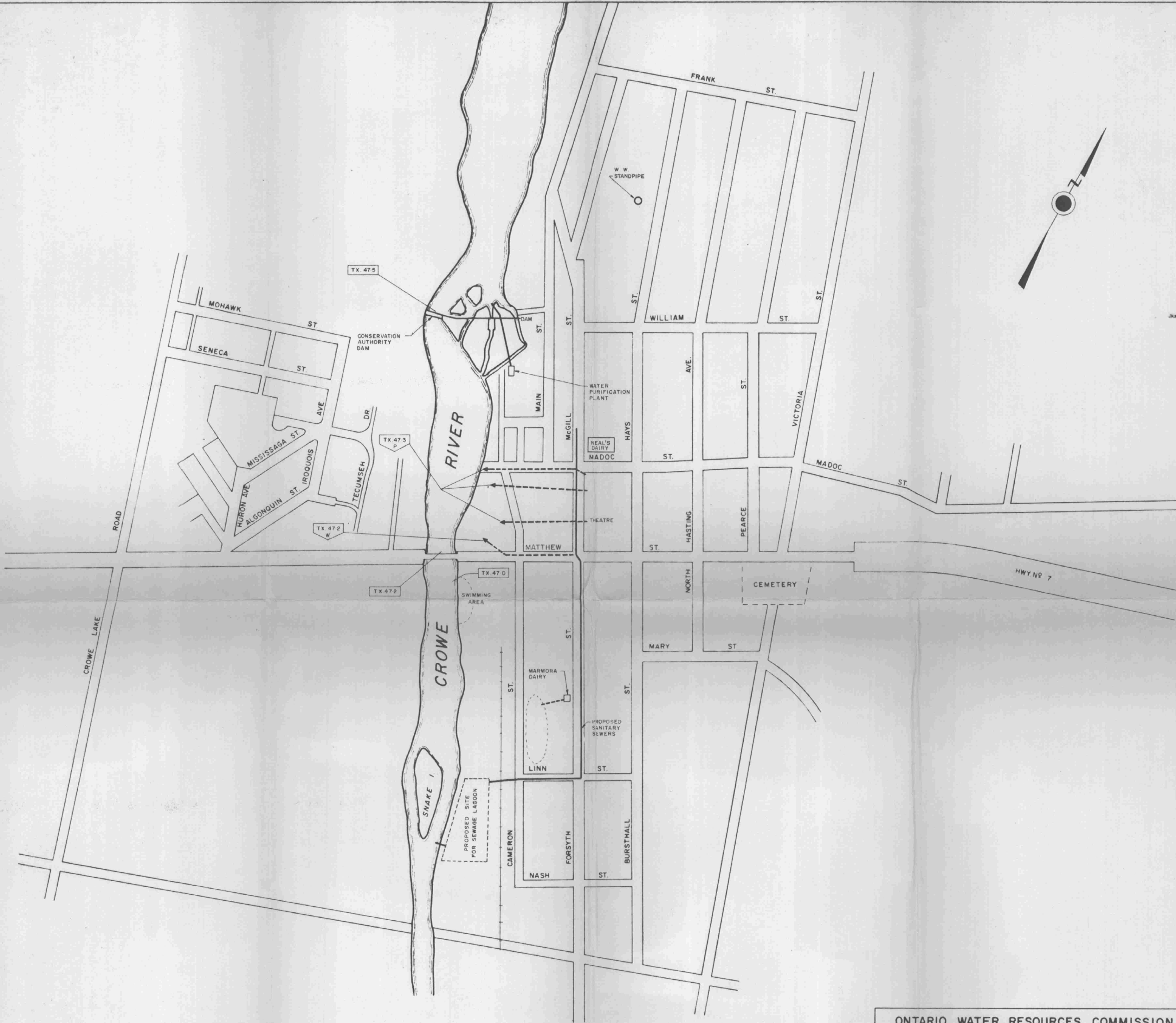
ALL ANALYSES EXCEPT PH REPORTED IN PPM.
UNLESS OTHERWISE INDICATED.

<u>DATE OF SAMPLE</u>	<u>SAMPLE POINT NO.</u>	<u>LAB. NO.</u>	<u>5-DAY B.O.D.</u>	<u>SOLIDS</u>			<u>TURBIDITY IN SILICA UNITS</u>	<u>BACTERIOLOGICAL LABORATORY</u>	
				<u>TOTAL</u>	<u>SUSP.</u>	<u>DISS.</u>		<u>LAB. NO.</u>	<u>MF COLIFORM COUNT/100ML</u>
JULY 18	TXP 61.9L	R-2339	1.5	464	--	--	1	R-7514	269,000
JULY 20	TX 47.2W	R-2487	3.2	872	--	--	2	R-7725	6
JULY 19	TXM 113.9T	R-2482	9.2	178	12	166	--	R-7720	20

R-2339 - DRAINAGE FLOWS DISCHARGING FROM HAVELOCK TO PLATO CREEK

R-2487 - MUNICIPAL STORM SEWER AT MARMORA- DISCHARGING TO FLOOD PLAIN OF CROWE RIVER- E.BANK, NORTH SIDE OF BRIDGE

R-2482 - EFFLUENT FROM CARDIFF SEWAGE LAGOON- DISCHARGING TO MINK CREEK



LEGEND:

- TX.47-2 - STREAM SAMPLING POINT SHOWING STREAM AND MILEAGE
 TX.47-2 W - OUTLET SAMPLING POINT SHOWING STREAM, MILEAGE AND TYPE.
 (SUBSCRIPT NUMBER USED IF IDENTICAL SYMBOL AT ONE POINT)

TYPE OF EFFLUENT:

- P - PRIVATE OUTFALL
 W - WATER (STORM SEWER)

ONTARIO WATER RESOURCES COMMISSION

VILLAGE OF MARMORA

MUNICIPAL SANITARY SURVEY
 SHOWING PROPOSED SANITARY SEWAGE WORKS
 1961

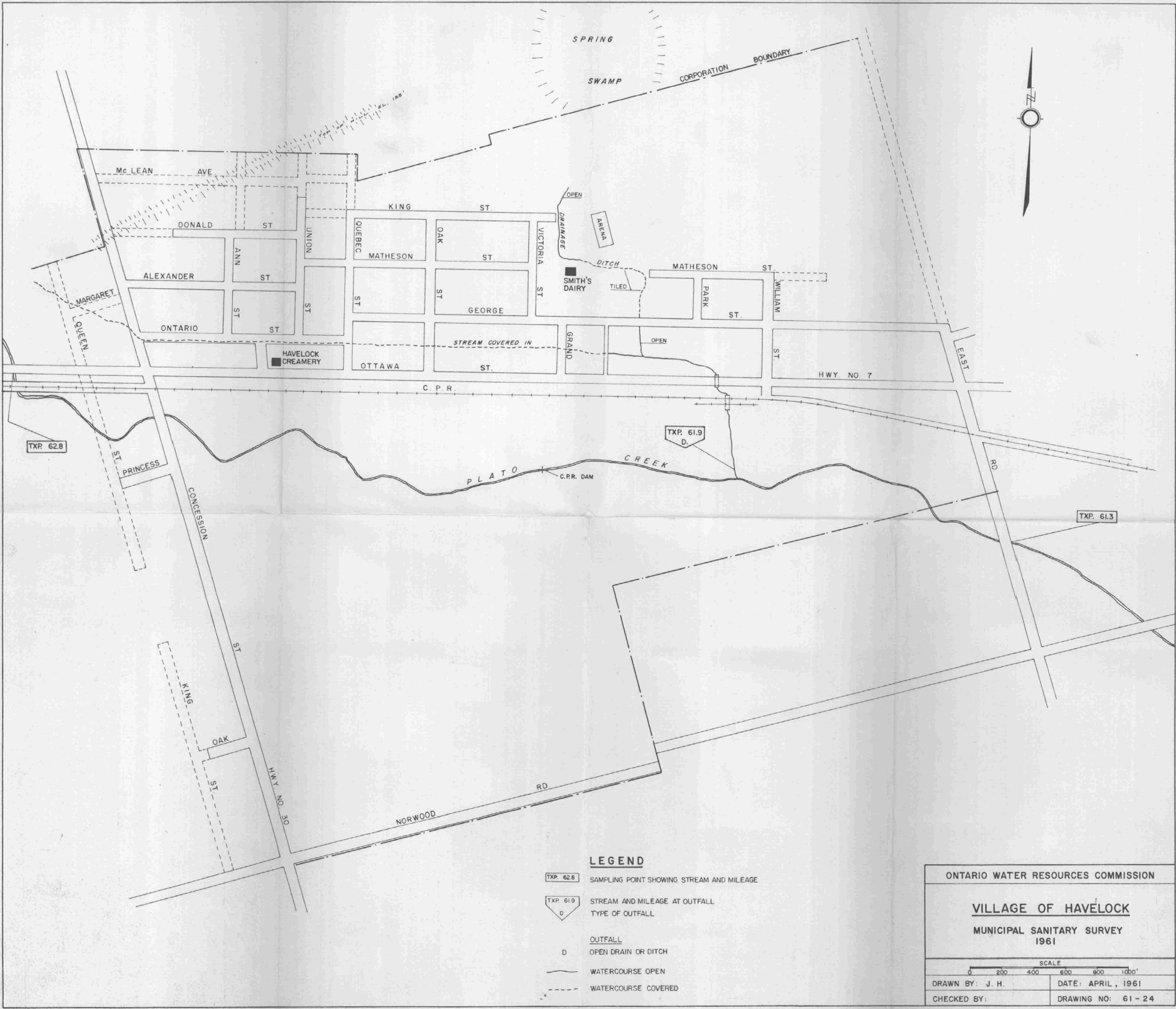
SCALE: 1" = 400'

DRAWN BY: J.R.

DATE: MARCH 1961

CHECKED BY:

DRAWING NO 61-15



LEGEND

- TXP. 62.8 SAMPLING POINT SHOWING STREAM AND MILEAGE
- TXP. 61.9 D STREAM AND MILEAGE AT OUTFALL
D TYPE OF OUTFALL
- OUTFALL
- D OPEN DRAIN OR DITCH
- WATERCOURSE OPEN
- - - WATERCOURSE COVERED

ONTARIO WATER RESOURCES COMMISSION

VILLAGE OF HAVELOCK
MUNICIPAL SANITARY SURVEY
1961

SCALE

0 200 400 600 800 1000'

DRAWN BY: J. H.

DATE: APRIL, 1961

CHECKED BY:

DRAWING NO: 61-24

LABORATORY LIBRARY



96936000118517

MOE/CRO/WAT/ASNS +3 maps
Barrens, R.G.
Report on water
pollution survey of asns
the Crowe River c.1 a aa



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Laboratory Library
125 Resources Rd.
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Canada